

Claims

- [c1] 1 .A lighting apparatus comprising:
a wave guide having microstructures arranged on a surface thereof, said microstructures interacting with light in the wave guide to scatter at least a portion of the light out of the wave guide in a pattern, the pattern being determined by the arrangement of the microstructures; and
a plurality of light emitting diodes that are coupled to the wave guide and inject light into the wave guide.
- [c2] 2 .The lighting apparatus as set forth in claim 1 , wherein:
the pattern includes at least one of a letter, a numeral, an arrow, an iconic image of a walking man, an iconic image of a hand, an iconic image of a circle with a slash drawn there through, an iconic image indicating "pedestrian don't walk," and an iconic image indicating "pedestrian walk."
- [c3] 3 .The lighting apparatus as set forth in claim 1 , wherein the pattern further comprises:
light scattered at wide angles, which light is viewable at a wide range of viewing angles.
- [c4] 4 .The lighting apparatus as set forth in claim 1 , further comprising:
a cladding comprising one of a surface coating and a cladding material, said cladding being disposed on the surface on which the microstructures are disposed, said cladding cooperating with the microstructures to effectuate the light scattering.
- [c5] 5 .The lighting apparatus as set forth in claim 1 , wherein the wave guide further includes:
a tinting whereby the scattered light has a pre-selected color.
- [c6] 6 .The lighting apparatus as set forth in claim 1 , wherein:
the surface on which the microstructures are arranged has a pre-selected curvature.
- [c7] 7 .The lighting apparatus as set forth in claim 1 , wherein:

the wave guide defines a planar region; and
the plurality of light emitting diodes are arranged around at least a portion
of a perimeter of the planar region and inject light into the planar region of
the wave guide.

[c8] 8. The lighting apparatus as set forth in claim 7, wherein:
at least a portion of the surface on which the microstructures are arranged is
tilted with respect to the plane of the planar region such that the tilt
cooperates with the microstructures and the plurality of light emitting diodes
to effectuate the scattering of the light in the pre-determined pattern.

[c9] 9. The lighting apparatus as set forth in claim 7, further comprising:
an index-matching material disposed at least between the plurality of light
emitting diodes and the wave guide.

[c10] 10. The lighting apparatus as set forth in claim 7, wherein the plurality of
light emitting diodes includes:
a first sub-set of light emitting diodes emitting light having a first color; and
a second sub-set of light emitting diodes emitting light having a second
color that mixes with the first color in the wave guide to produce a third
color.

[c11] 11. An optical wave guide for use in conjunction with an associated light
source, the optical wave guide comprising:
a translucent material formed into a shape having a top surface, a non-
parallel bottom surface, and at least one side surface in optical
communication with the associated light source; and
a plurality of microstructures disposed about the bottom surface, said
plurality of microstructures cooperating with the bottom surface to scatter at
least a portion of light injected from the associated light source, the
scattered light exiting the wave guide through the top surface.

[c12] 12. The optical wave guide as set forth in claim 11, wherein the scattered
light forms a pre-selected light output pattern viewable outside the wave

guide.

- [c13] 13. The optical wave guide as set forth in claim 11, wherein the plurality of microstructures include a surface roughness or texture formed into the bottom surface.
- [c14] 14. The optical wave guide as set forth in claim 11, further comprising: a cladding material disposed on the outside of the bottom surface that cooperates with the plurality of microstructures to effectuate the light scattering.
- [c15] 15. A lighting apparatus comprising:
a light emissive face including a textured surface; and
a plurality of light producing elements arranged about a periphery of the light emissive face, the light producing elements producing light substantially along an axis orthogonally disposed relative to the light emissive face, wherein light interacting with the textured surface is emitted from the light emissive face.
- [c16] 16. The lighting apparatus as set forth in claim 15, wherein the light emissive face defines a center and a perimeter where a thickness of the light emissive face at the perimeter is greater than a thickness of the light emissive face at the center.
- [c17] 17. The lighting apparatus as set forth in claim 15, further comprising an encapsulant surrounding the plurality of light producing elements and abutting the light emissive face, the encapsulant matching a refractive index of the light emissive face.
- [c18] 18. The lighting apparatus as set forth in claim 15, where the textured surface forms a symbol.
- [c19] 19. The lighting apparatus as set forth in claim 15, where the textured surface comprises a plurality of microstructures arranged in a pattern on an interior side of the light emissive face.